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THE WILLOW PTARMIGAN

By JOSEPH GRINNELL*

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The word Ptarmigan is applied to several species and races of grouse-like birds comprising the genus *Lagopus*. The name was chosen appropriately, for "Lagopus" signifies "rabbit-foot," and refers to the chief character by which Ptarmigan are distinguished from other members of the Grouse family, namely, the heavy clothing of hair-like feathers which envelop the feet. In all but one of the species there are remarkable changes of plumage twice a year, through which there is acquired for the winter season a snow-white dress. This, and the fact that Ptarmigan live in the far north or on the tops of high mountains, where the climate is severe, probably gave basis for the other name, Snow Grouse, used commonly for the birds in some parts of their range, as in Alaska.

In America there are three distinct species of Ptarmigan. One of them, the White-tailed, lives upon the snowy summits of the Rocky Mountains south as far as northern New Mexico. The Rock Ptarmigan inhabits the mountainous country farther north, and, as represented by various subspecies, is found from Greenland, across the continent and on nearly every one of the long chain of Aleutian Islands. The third American species, the Willow Ptarmigan, with which the present essay is concerned, is most abundant on that level or rolling arctic prairie-land known as tundra. This tundra extends almost unbrokenly clear across North America from Labrador to western Alaska, and may be said, in a general way, to occupy the interval between the tree limit and the Arctic Ocean. In western and northern Alaska, these tundras are covered with a deep layer of moss and lichens. Here or there in 'draws' or shallow valleys, there are tracts of dwarf willow and alder. In summer the tundras are boggy, and the numerous ponds and connecting channels make traveling difficult. In winter they are frozen solidly, and the wind-driven snow packs into the depressions so that the surface is nearly smooth.

Save for black tail-feathers, almost completely concealed when the bird is at rest, and the black of bill and eyes, the Willow Ptarmigan in the winter season is pure white. When the white feathers first appear, in the fall, they possess a perceptible, though faint, tinge of pink; but this soon fades out.

The pure white winter dress is believed to make the birds so inconspicuous against the white of the landscape that they many times escape discovery by their enemies, the arctic fox and gyrfalcon, as they certainly do by the human hunter. On a day when the sky is overcast with dense haze, obscuring the direct rays of the sun, and dispersing an intense, even light, the Ptarmigan

*Contribution from the Museum of Vertebrate Zoölogy of the University of California.

are extremely hard to discern against the blank whiteness of their surroundings. Even when fresh foot-prints in the snow and occasional calls told of their near vicinity, I have often found myself to be within but a few yards of the birds before they would take flight with startling whirr of wings and hoarse notes of alarm. Then, as a bird would alight at some distance, it would seemingly vanish from the sight, not infrequently defying rediscovery altogether.

On the occasional cloudless day, when the sun shines unobstructedly, even white objects are brought out in sharp relief by their long, dark shadows cast upon the snow. If approached at right angles to the rays from the sun, the Ptarmigan may then be discerned at several hundred yards distance. But they are then shy, for they have a marvelous way of appearing to know whether or not the hunter is actually aware of their exact whereabouts.

During the eight-months winter season, the Willow Ptarmigan feed upon the buds and tender terminal twigs of the dwarf alder and willow; this, and practically nothing else, save that quartz gravel is regularly gathered from the river-bars where the wind bares the ground of snow.

The Willow Ptarmigan are by nature gregarious. Especially is this trait exhibited in the autumn months, when in the most northern localities a partial migration is undertaken a few hundred miles to the south, or into great valleys where more food and better cover are afforded. For the birds do show a predilection for the vicinity of brush-patches, or even tracts of stunted spruce trees in regions where these exist. Not infrequently they escape from the dash of the Falcon by taking refuge in a bush, among whose stems the snow rests lightly, and into which the frightened bird is able to plunge quite out of sight.

In the early spring, long before the thaw commences in earnest, the male Ptarmigan begin to change to a rich chestnut-brown color on the head and chest, and a bright red comb develops above each eye. For a time, in April and early May, the males, with their deep brown mantles and white bodies, are very conspicuous. They are then more noisy than at any other season, uttering, at frequent intervals until late dusk, a low, harsh 'cackle,' roughly imitated in the Eskimo name for the Willow Ptarmigan, A-käzé-rh-gäk.

The male Ptarmigan wear this special courting plumage until June, when another change, involving the whole body plumage, leads to a brown-black-and-buff plumage, which is worn until autumn. The females, meanwhile, change rapidly in early May, about the time the snow begins to disappear, to a mottled and barred, black-and-brown coloration. In this "summer protective" plumage the birds of both sexes are as difficult to see against the green, brown and gray of the open tundra as they were in winter plumage, against the white landscape.

All these remarkable changes in appearance are the result of *molts*, by which feathers of one color fall out and new ones of a different color grow in. In the autumn, exactly the same process leads from the brown and mottled coloration of both old birds and young-of-the-year to the pure white of winter dress.

But while in the spring molt the feathers of the head, neck, and back are the first to be replaced, in the fall these are the last tracts affected; so that by the middle of October birds are to be seen with dark feathers still predominating in the head and back. This, of course, gives much the same effect as at an early stage of the spring molt.

The female Ptarmigan selects the site for her nest during the third week of May, and by the second week of June full sets of eggs are the rule. The nest is a slight depression in the moss on the open ground; usually the summit of a hummock is selected, as being a drier situation during the period of early summer rains. There is a scanty lining of dry grasses, to keep the eggs from actual contact with the saturated moss of the foundation.

The full set of eggs numbers from eleven to thirteen. They are very deeply and closely spotted and blotched with chestnut-brown, the effect being to render them difficult to distinguish from their surroundings, even when lying in plain view but a few feet from the observer. The female bird does all of the sitting, and when approached on the nest does not take flight until almost trodden upon. She then exhibits the greatest solicitude, tumbling about within a few yards of the intruder in the most distressing manner. The male bird sometimes puts in an appearance, but keeps discreetly at a much greater distance.

After the eggs are hatched, the precocious youngsters are accompanied by both parents. They then have the faculty, so like that of young Quail and Grouse, of concealing themselves at a moment's notice, while the parents attempt to call the intruder's attention elsewhere. The young are at first clothed with down, of yellow and brown shades; but before they are half-grown this is entirely replaced by loose-textured feathers, and even before half-grown they are able to fly as readily as the adults.

In summer, the Willow Ptarmigan's bill of fare includes many sorts of insects, as well as green herbs. In the fall, the abundant crops of blueberries, heathberries, cranberries, and roseapples are freely resorted to, and these fruits become again available the following spring, when the retreating snow leaves them exposed.

The reader will have already marveled at the special and useful modifications in the habits and structure of the Ptarmigan, which enable it to carry on a successful existence under such an extreme and winter climate. Perhaps the most wonderful thing about the bird is its alternating adaptations to the opposite conditions of the short summer period. Not only is the summer plumage of a totally different general color, as already described, but it is much less dense than the winter plumage. The molts, however, do not affect the feathers of every part of the body. The wing and tail feathers are changed only at the time of the fall molt which, in fact, is the only complete molt. The feathers of the feet and legs are not replaced in the spring; but, as summer advances, the old feathers become brittle and *wear* off, until midsummer

finds the birds with almost naked feet,—a heavy feathering at that season probably being not only needless but a hindrance, as it would be especially when wet.

The toe-nails in winter are so long as to project considerably beyond the generous feathering of the feet and toes. They probably serve as "ice-creepers," of great use in walking or wallowing in crusty snow. But the extraordinary thing is that in summer the old toe-nails drop off, or molt, new ones growing from the quick!

In winter plumage, one set of feathers fails to conform to the general whiteness—the tail-feathers. When the bird is at rest, the very long upper and under tail-coverts almost completely conceal these black tail-feathers, which are then closed together in narrow ranks. But, when the bird takes flight, the tail is widely spread, and a black "directive" marking flashes forth against the white background. In summer, the wing-feathers, left over unmolted from the winter dress, are unnoticed in the bird at rest; but, as the wings are spread in flight, they furnish again a conspicuous "directive" pattern against the dark landscape, the black tail-feathers being then ineffective.

With all its marvelous fitness, the Ptarmigan has much to contend with—just as much as have our southern Quail and more than our Grouse—for the birth-rate provides a sure index of the death-rate. If each pair of Ptarmigan produces an average of ten young each season, then ten out of every twelve existing at the close of the incubatory period are doomed to die within the next twelvemonth. Before the invasion of the white man to upset the natural balance, the Ptarmigan had many regular enemies—the arctic fox, the weasel, the Rough-legged Hawk, and the Gyrfalcon.

Looked at from the utilitarian standpoint, the Ptarmigan, on the far northern frontier, affords an even more important game resource than did the native birds in the early days of the settlement of the States. The weight of a Willow Ptarmigan is one and one-half pounds, so that each bird affords as much food as four or five Bob-whites.

In most of the vast northern region, conditions yet remain practically primitive so far as wild game is concerned. But, around the mining settlements of Alaska and Yukon Territory, the larger animals have been much reduced in numbers, or entirely used up. It is fairly certain that many natural enemies of the birds have been reduced to small numbers, to the great advantage of the Ptarmigan. This has doubtless served to offset the effect of the firearm, so that only in the near neighborhood of settlements has there been a notable decrease in the supply of birds.

With proper study of the situation and suitable legislation based thereon, to apply to the most thickly settled districts, the Willow Ptarmigan should constitute a valuable and permanent game resource in a country where the food-value of game-birds far exceeds that here in the states where sport is the chief element to invite pursuit.

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Order—GALLINÆ
Genus—LAGOPUS

Family—TETRAONIDÆ
Species—LAGOPUS

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